BOOK REVIEW

Histoire du Concept d'Espèce dans les Sciences de la Vie, by Scott Atran *et al.* Fondation Singer-Polignac, Paris, 1987. xiii + 324 pp. ISBN 2-900927-19-6. 150 francs softcover.

This valuable book contains 15 chapters based on papers presented at a meeting in May, 1985, held in Paris under the auspices of the Fondation Singer-Polignac. This foundation is named after the Princesse Edmond de Polignac, née Winaretta-Eugénie Singer, who was born in New York in 1865. It is thus appropriate that some papers are in English and others are in French.

The importance of this set of papers is in part, as M. J. S. Hodge notes in his article ("Darwin, Species and the Theory of Natural Selection"), because the contributors have collectively engaged in a study of the *longue durée*—applied to the history of science, the long-term intellectual and institutional life of science. In the past we have tended to consider species concepts in the context of taxonomic species. In this volume many contributors take a refreshingly broad approach to their subject, stepping back from the issues of taxonomic species and species concepts and illuminating issues that are very much current; discussion among biologists is also becoming less introspective. Hodge himself emphasizes ambiguities between conceptualizations of species presupposed by an explanatory program and the definition of species as a classificatory category and shows how Darwin's species concept ultimately depends on the former. From late 1837 to late 1838, Darwin emphasized that cessation of interbreeding was necessary for the adaptation and formation of "good species." However, as the analogy between artificial and natural selection assumed more prominence in his mind, he dropped this requirement, and with it the idea that species occupied a particular rank in the hierarchy of nature. Species as taxa existed, and Darwin recommended following the species limits of the masters of the art, but there were no criteria other than custom for ranking species.

Phillip Sloan ("From Logical Universals to Historical Individuals: Buffon's Idea of Biological Species") takes a similar approach. He shows how Buffon integrated contemporary discussion on issues such as calculus and probability with William Harvey's separation of two senses in which species were used in the work of Aristotle. Buffon distinguished between mathematical truth, which was arbitrary and abstract, and physical truth, which was grounded in fact and had a probability approaching certainty. Hence Buffon rejected species as universals—they were abstract—and accepted species as wholes and individuals, rather than as collections of things. To Buffon, it was not the individual in the strict sense, but the chain of successive individuals that constituted the species, that was the great marvel. Genealogy, but not only of species, was all; classi-

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fication was to be true "Naturgeschichte," not just "Naturbeschreibung." However, as Sloan has discussed elsewhere, the latter predominated. The reasons for this need detailed study. A contributing factor may be that the only tool by which genealogy could be directly established remained for almost two hundred years the ability to interbreed. This surely meant that Buffon's ideas at the species level could be difficult to distinguish from more conventional species concepts. Yet in many of these, even the most "fixist," genealogy and individuality of a sort were very important; it is only now that details of the relationship between morphology and genealogy are being teased apart.

Richard Burkhardt, Jr. ("Lamarck and Species") suggests that Lamarck did not alter the way in which he described taxonomic species, despite his changing ideas about what species represented in the natural world. Taxonomy even then had its own requirements (which it has been inclined to defend against the natural world ever since!). Toward the end of Lamarck's life, it seems that his concept of species reverted from nominalist back to the position that he held when writing the *Flore Françoise*—that they were real. Unfortunately, Burkhardt's discussion does not allow us to establish clearly enough the context of the change. Intergradation, for Lamarck, was a geographic as well as a temporal phenomenon, but at any one time and place species would be discrete.

The issue of what such locally discrete species represent figures largely in Scott Atran's paper ("The Early History of the Species Concept: an Anthropological Reading"). He observes that taxa in the fundamental rank of folk classification, the generic-specieme (in the strict sense, the representative of a genus growing in a local area), were recognized using morpho-ecological criteria; unlike some authors, Atran dismisses more culturally bound concerns, such as utility, as having little effect. Breeding criteria were introduced into species concepts by Andrea Cesalpino and John Ray as knowledge developed a broader geographic base: organisms that bred true showed only accidental variation and formed the abstract types that could be placed in a universal taxonomy.

There are still major tensions between the folk species concept (or, more properly, the generic-specieme concept), the nondimensional species that Ernst Mayr ("The Species as Category, Taxon and Population") defends vigorously, and the taxonomic species. Mayr emphasizes the interest of biologists in sympatric situations and local populations, the potential status of an allopatric population being usually biologically rather uninteresting for Mayr. Some of these tensions have obvious causes, as in Mayr's article: for instance, the term "population" is not clearly defined and the taxonomic-morphological species is equated with the typological (Donn Rosen's species are branded as "typologically defined morphospecies").

For Bernardino Fantini ("L'Entrée de la Biologie Moléculaire dans la Définition de l'Espèce") the definition of species as a taxonomic unity remained untouched by molecular biology, which has focused on mechanisms of speciation. Untouched or passed by? The biological species concept was championed by Mayr in 1942 so that the origin of species could be discussed. But for this, species either have to be the units that evolved, or to stand in some static relationship to those that did (Mayr discusses stasis briefly). Birds (perhaps) aside, are taxonomic species in general units of this sort? Can they be,

should they be, and what are the consequences for both taxonomy and biology of the various ways in which these questions are answered?

Anne Diara introduces such questions in her paper, appropriately titled "Les Espèces Sont-Elles Filles de la Nature ou du Naturaliste?" She discusses the apparent conflict between the species concepts of Alexis Jordan, a misanthropic royalist and fixist who circumscribed species very closely, and Charles Naudin, a much more central figure on the French biological scene who came to believe in evolution by 1852 (but never seems to have accepted natural selection). Diara suggests rightly that the argument was less over "facts" than how those "facts" should be interpreted (see also Jean-Louis Fischer, "Espèce et Hybrides: à Propos des Léporides"). As she notes, the taxonomic philosophy of Jordan (of whom Naudin contemptuously remarked that, with all his new species, he had not introduced a single new fact into science) was agreeable to Hugo de Vries. De Vries's work, reinterpreted although it soon was, nevertheless focused attention on the nature of the Linnaean species. Diara briefly discusses a series of papers on species concepts in the *American Naturalist* of 1908, and she sees Linnaean classification as being maintained primarily for logical reasons. Further development of this point would have brought the arguments closer to home (and would probably have made the article far too long). Linnaean species, at least in the context of the polemics of that time, were broadly circumscribed, yet despite all the lip service paid to them, few of the botanists who extolled their virtues over the next fifty years—a list would be surprising in both length and content—were able to find biological reasons for maintaining them.

One is left feeling that what one thinks might matter when it comes to the delimitation of species, does not, and what should not, does. The requirement that taxonomic species be readily recognizable is clearly responsible for much of this confusion. Mary P. Winsor (Louis Agassiz and the Species Question, Studies Hist. Biol. **3:** 89–117. 1979) shows how hard it is to provide a reasonable evaluation of the link between species concepts and species taxa; overall, it was not Agassiz's ideas that were unscientific but his dogmatism. It was not simply because Jordan did not believe in evolution that he described so many new species from France; splitters are not necessarily "typologists." His fixist colleagues did not rise to his defense, while others found it hard to dismiss all his species as being absolutely worthless due to the very fact of evolution.

Evolution has only gradually shaped species concepts and species taxa. In ornithology this change was greatly helped by the new "nomenclatural" code proposed by the American Ornithologists' Union in 1885. Antonello La Vergata ("Au Nom de l'Espèce. Classification et Nomenclature au XIXe Siècle") shows that apparently arid nomenclatural debates over the name of a species may be, as he puts it, carried out in the name of the species, that is, a particular conception of nature. How authorities were cited when a species was transferred from one genus to another depended quite largely on whether species were conceived of as logically (and biologically) part of the genus in which they were placed (the Linnaean position), or the species (both as rank and taxon) was seen as more real than the genus. Priority does not necessarily have to do with the rights of the dead, but rather with the concepts of the living. Another

nomenclatural dispute that involves similar issues and that would repay study concerns species groups. These were ultimately accepted in zoology, in part because they were seen to be compatible with evolution, and rejected in botany.

Returning to a theme of the book, discussions about species concepts must often range beyond taxonomy if they are to be properly understood: arguments about nomenclature and classification may be so bitter and protracted precisely because there are larger issues at stake. Furthermore, there are only partly overlapping groups of people using terms such as "species." Pietro Corsi ("Julien Joseph Virey, le Premier Critique de Lamarck") shows how Virey's writings, with their implicit and explicit species concepts, reached a wide segment of the francophone world (as is also true of Buffon's work). What does today's public think is being saved when a species is conserved, and where did they get their ideas?

There are other useful essays; here I have focused on those most of interest to botanists. Although it may be a little hard to get hold of a copy of this book, it is most highly recommended for all biological libraries, and it is even not out of reach of less-than-well-paid taxonomists. The issues raised in it demand serious thought. The editing is on the whole good, although I think that three spellings for "armadillo" in eight lines must be something of a record; Qaddafi will have to look to his laurels in this department.—P. F. STEVENS, Harvard University Herbaria, 22 Divinity Avenue, Cambridge, Massachusetts 02138.